Chemical Name: Chlorophacinone, Bromadiolone, Brodifacoum, Diphacinone

PC Code: 067707, 112001, 112701, 067701

CAS No: 3691-35-8 , 28774-56-7, 56073-10-0, 82-66-6

MRID: N/A

ECOTOX Record Number: 69367

Citation: Byers, R. E. (1978). Performance of Rodenticides for the Control of Pine Voles in Orchards. *J. Am. Soc. Hortic. Sci.* 103: 65-69.

Purpose of Review: Rodenticide Evaluation

Date of Review: 10/24/11

Description of Use in Document (QUAL, QUAN, INV):

Qualitative

Summary of Study Findings:

The study authors performed several experiments including determining LD_{50}s of various compounds to pine and meadow voles, laboratory and field choice efficacy tests, and the long-term effectiveness of diphacinone, chlorophacinone and Endrin over a multiple year period. The reviewer only evaluated the data presented for the acute oral LD_{50} determination and not the additional experiments.

Pine and meadow voles (*Microtus pinetorum* and *M. pennsylvanicus*) were wild caught from orchards near Winchester, Va., and acclimated for 3 weeks in laboratory cages. Some additional pine voles were trapped from an orchard that had been subjected to 2 years of rodenticide treatment with chlorophacinone and diphacinone in order to determine LD_{50}s in potentially resistant test subjects. Animals were fed on commercial rat food and water. Apples were supplied for food during the acclimation period but were removed the last 3 days prior to beginning the feeding trails. Pine voles were at least 20g and meadow voles weighed at least 25g.

Toxicants were dissolved in a small quantity of acetone and then added to corn oil, eliminating the acetone using bubbling nitrogen. Brodifacoum was used in an ethylene glycol solution. All toxicants were administered by gavage in solutions of 0.1 ml/20g body wt. Pine voles were dosed with chlorophacinone at 4, 10, 18.5, and 25 mg/kg (40 voles/treatment level); diphacinone at 10, 20, 50, 100, 150 and 200 mg/kg (10 voles/level); bromodialone at 1.25, 2, 5, 10 and 25 mg/kg (10 voles/level), and brodifacoum at 0.18, 0.37, 0.75, and 1.5 mg/kg (10 voles/level). Meadow voles were dosed with diphacinone at 5, 25, 50, and 100 mg/kg (10 voles/level) and

brodifacoum at 0.18, 0.37, 0.75, 1.00 and 1.5 mg/kg (10 voles/level). The pine voles caught from the orchard previously subjected to chlorophacinone and diphacinone treatments were dosed with diphacinone at 20, 50, 100, 150, 200 mg/kg (10 voles/level). The study author did not state whether controls were used for the LD_{50} component of this paper. The data were statistically analyzed using probit analysis and the Litchfield Wilcoxon method.

The results of the acute oral data are presented below:

Rodenticide	Vole Species	LD_{50}[1] (mg ai/kg)	95% C.I.	LD_{50}[2] (mg ai/kg)	95% C.I.	Slope[2]
Brodifacoum	Pine	0.42	0.24-0.67	0.36	0.22-0.59	0.61
	Meadow	0.82	0.63-1.11	0.72	0.53-0.98	0.73
Bromadiolone	Pine	6.2	5.1-7.3	3.9	2.3-6.8	0.58
Chlorophacinone	Pine	17.3	13.4-21.8	14.2	11.4-17.6	0.81
Diphacinone	Pine	67.7	54.4-82.7	57.0	34.4-94.3	0.60
	Meadow	11.7	7.4-15.1	14.0	8.8-22.1	0.63
Diphacinone	Pine[3]	114	58-186	102	35-188	0.54

[1]LD_{50} determined by probit analysis
[2]LD_{50} and slope determined by Litchfield and Wilcoxon method
[3]Suspected resistant strain

Rationale for Use:

Provides LD_{50}s for pine and meadow voles exposed to the chemicals brodifacoum, bromadiolone, chlorophacinone and diphacinone and can be used to compare species sensitivity variability of mammalian species.

Limitations of Study:

- Uncertain if controls were used.
- Data regarding food consumption, weight gain, and sublethal effects were not provided.
- Percent active ingredient and a Certificate of Analysis were not provided.

Description of Use in Document (QUAL, QUAN, INV):

Qualitative

Primary Reviewer: Michael Wagman, Biologist, EPA/ EFED/ERB6 MWagman 5/9/12